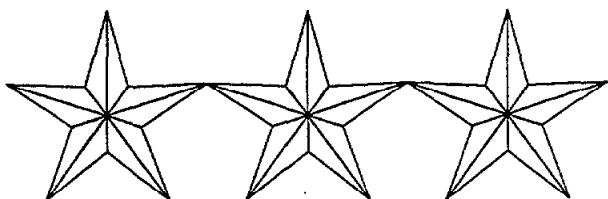

U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY

EXPLOSIVES SAFETY

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FROM THE ARMY'S EXECUTIVE DIRECTOR FOR EXPLOSIVES SAFETY (EDES)

As the Army's Executive Director for Explosives Safety (EDES), I'd like to share my perspectives on explosives safety as experienced by the soldiers and civilians who accomplish our ammunition mission on a daily basis. I'd also like to thank my predecessors for implementing the explosives safety program we have today.

Our record is very good in the critical explosives safety area. The number of incidents we experience is small when compared to our constant exposure to ammunition in the manufacturing, testing, storage, and disposal processes. However, when we do experience an incident, people are often killed, or severely injured. For these reasons, we will continue to emphasize the use of proven safe procedures whenever we deal with ammunition and explosives.

Engineering, education, and leader involvement are the three key factors sustaining our excellent record:

- Our munitions are engineered to be safe. Provision of minimum arming distances and redundant safety features is planned from item design inception.
- We do a great job educating our personnel on correct ammunition handling procedures. Safety is embedded in all of our operations, and Army schools teach the required safety techniques.
- Finally, our leaders do an excellent job of enforcing safe practices in our munitions workshops and in the logistics and training environments. Supervision, frequent safety reminders, attention to detail, and display of true care for soldiers and workers effectively shield our people from the temptation to abuse munitions.

We can all look forward to the development of even safer munitions and procedures. I actively solicit your ideas and encourage the free flow of information relative to explosives safety. Every soldier and civilian must promote all aspects of explosives safety in their duty performance. Unsafe ammunition handling practices can potentially impact us all.

Keep up the good work!

JOHN G. COBURN
Lieutenant General, USA
Executive Director for
Explosives Safety

LESSONS LEARNED

Recently at an Army Ammunition Plant (AAP) an accidental detonation of explosives occurred when a mechanic turned a bolt on a flanged lacquer drop line. The piping itself did not carry explosives material. The explosives apparently seeped into the threads of the nut and bolt from accidental splashing during floor washdowns. The mechanic involved did follow approved procedures by applying penetrating oil several times before attempting to loosen the bolt. Fortunately, no one was hurt and no property was damaged.

This incident proves that when explosives are present, they can migrate to many hidden places. This fact must be remembered as we proceed with decontamination and disposal of equipment.

The U.S. Army Armament, Munitions and Chemical Command (AMCCOM) Safety Office has developed a draft IOCP 385-1, Guidance on Detection and Remediation of Explosive Contamination, that provides user-friendly information on where contamination usually hides, how to detect it, and how to get rid of it. The draft Pamphlet is based on the explosives safety experience of contractor and Government personnel at several AAPs and HQ, AMCCOM. It uses real-world examples to illustrate its practical advice and guidance. Electronic copies of it are available by contacting Mr. Ralph Knape, AMSMC-SFP, DSN 793-2973. Official publication is expected shortly after the Industrial Operations Command (IOC) is established in July 1995.

by: Jerry M. Bryan
AMCCOM Safety
DSN 793-2983

X AND Y SITES FOR OUTDOOR STORAGE

The origins of the terms X and Y storage sites can be traced to ORDM 7-224, dated 1931. Y-site (yard storage) indicated a holding yard awaiting movement into magazine storage. X-site (expedient storage) designated a temporary storage area. Chapter 8, draft DAP 385-64 states "... (open storage) is a temporary expedient and may not be employed in place of standard methods for long-term storage..."

U.S. Army Materiel Command (AMC) defines Y-site as "... sites located between earth covered magazines (ECMs) (commonly referred to as Y-sites), special provisions apply. These sites have earth embankments on three sides and are common to many AMC installations." This definition makes it easy to state that Y-sites are between ECMs and revetted (barricaded), while X-sites are open storage not between ECM's and may or may not be revetted. X-sites may or may not be covered.

The difference between X and Y storage sites is location. They are intended to be temporary and must not violate quantity distance (QD) requirements or cause adjacent structures to become in violation of QD. X and Y storage sites must also provide as much protection from the elements as possible. This protection can be in the form of a tarpaulin cover over framework, pole buildings, or shelters such as clamshells or lightweight mobilization structures. The purpose of Y and X storage sites is munitions storage and require that they be provided lightning protection (LP). Approval of both X and Y sites must be obtained by site plan submission.

by: Jimmy L. Langley
Occupational Safety and Health Specialist
DSN 585-8767

REMEMBER to return the survey if you wish to continue receiving the bulletin.

EXPLOSIVES SAFETY INSPECTIONS

Explosives safety inspectors conduct a comprehensive safety inspection to check all aspects of an explosives operation. Their main goal is to identify safety program problems and to assure implementation of the accident prevention and loss control requirements established by the DA in accordance with AR 385-64.

The visiting inspector may spend time reviewing the safety program and safety education documentation, safety inspection of equipment, safety standards, prior inspections and surveys findings, previous accidents, system safety engineering, and SOPs followed by an inspection of the explosives facilities and operations.

Inspectors determine if the SOPs are current and accurate. They often ask employees if they have signed the SOPs and understand the contents. Inspectors want to know that employees are properly trained and have detailed knowledge of the hazardous materials used in their operations. Safety orientation, job instruction for new employees, and on-the-job training (OJT) for all employees are checked. Inspectors walk through the facilities and operations to get a "snap-shot" of the explosives safety awareness of the area and personnel involved with the operations.

Inspectors may observe: if explosives scraps are lying about on the floor (housekeeping), how protective clothing and equipment are maintained, if machine guards are in place, if machines are properly grounded and if the lightning protection system (LPS) is inspected on a regular basis, and if a hazard analysis has been prepared for this operation.

Inspectors look at explosives buildings/operation areas, magazines/storage areas, lightning protection (LP)/grounding, materials handling equipment (MHE), storage and processing of pyrotechnics burning/demolition ground/range, pressure/vacuum systems, mechanical equipment, electrical equipment, and personal protective equipment (PPE).

by: Robert Davidson
Safety Engineer
DSN 585-8627

ELECTRICAL TESTING OF A CATENARY SYSTEM

Testing the catenary's earth electrode subsystem, covered in appendix B of draft DAP 385-64, is relatively easy: disconnect the earth electrode subsystem at all ends from the aboveground catenary system when practical and possible, connect one lead to each end of the catenary system, then test the air terminals (lightning rods in accordance with paragraph D-3 of draft DAP 385-64).

If your leads are not long enough to test both ends of the catenary at once, test it in parts. Again, if possible, disconnect the catenary from the earth electrode subsystem. Connect the first probe at one end of the catenary and the other probe along the catenary then take a reading. Move the first probe near, but not beyond the second probe. Move the second probe closer to the other end of the catenary and take another reading. Repeat this until the entire system is covered. Record your readings. Note that no single reading can exceed the maximum given in appendix D.

Intervening down conductors are not required, but can help reduce the chance of side flashes. If you have intervening down conductors, they must meet the requirements of chapter 12, draft DAP 385-64 and be regularly tested.

by: Gregory Magerl,
Logistics Management Specialist
DSN 585-8743,

OPERATING BUILDINGS AT POSTS, CAMPS, AND STATIONS

Site and general construction plan submissions for post, camp and station ammunition supply points (ASPs) typically include a facility designated as an Ammunition Surveillance Workshop - a term that may be misleading at most ASPs. Personnel at these facilities primarily support issues to users and receipt-after-training functions. Inspection of ammunition loads on trucks; inspection of empty trucks destined to pick up ammunition for training; as well as receiving, segregating and repacking issues and returns are the main functions of the facilities and associated personnel. Traditional ammunition surveillance inspections such as periodic and storage monitoring inspections are very limited. The majority of the operations performed are associated with ammunition returned from users. In order to better describe our facilities in site submissions and minimize questions and confusion, the term "ammunition processing building" is recommended in future submissions.

by: Robert Rothenberg
QASAS
DSN 585-8804.

FUSIBLE LINKS

TM 743-200-1, Storage and Materials Handling, provides the following general information and specifications on fusible links for door and rear stack ventilators on magazines.

- The melting point will be between 155 and 165 degrees Fahrenheit.
- Minimum rated breaking strength is 20 pounds for the door ventilator link and 8 pounds for the rear stack ventilator link.
- Links must be approved by the Underwriters Laboratories, Inc., or other recognized testing laboratories.

According to ANSI/UL33, Standard for Safety, Heat Responsive Links for Fire Protection Service, the links should be marked with the temperature rating, a model or type designation, and the manufacturer's or private labeler's name or identifying symbol.

by: James B. Farley
QASAS
DSN 585-8787

HAZARD CLASSIFICATION (HC) CHANGES

The Department of Transportation (DOT) has reviewed the revision to TB 700-2, Department of Defense Ammunition and Explosives Hazard Classification Procedures, favorably.

Two changes, classifying items as 1.4S and allowing air shipment of explosives classified by an Interim Hazard Classification (IHC), have been implemented as policy letters by the Department of Defense Explosives Safety Board (DDESB).

The first subject modifies the method of classifying items as Hazard Class/Division/Storage Compatibility Group 1.4S. Up to this point, the 1.4S classification could only be allowed for tested items. Now, items may be classified 1.4S by analogy in obvious cases and there is no valid reason to suspect given an incident, the item would violate 1.4S criteria. The "S" criteria is ammunition presenting no significant hazard. This means the ammunition is packaged or designed so any hazardous effects arising from accidental functioning are confined within the package. Packages degraded by fire, do not have any blast or projection effects

significantly hindering fire fighting or other emergency response efforts in the immediate vicinity; i.e., 5 meters, of the package. This HC change applies to small arms ammunition (SAA) of identical caliber and net explosive weight (NEW) or to the situation where the new item contains less explosives than the tested item.

Restrictions were removed in the current TB 700-2, paragraph 9-3.d., which does not allow explosives classified by an IHC to be shipped by air. Commercial cargo aircraft may now transport Department of Defense (DOD) owned ammunition and explosives classified by an IHC.

by: Mark W. Skogman
Safety Engineer
DSN 585-8758

USE OF WRITTEN STANDARDS

Written standards must be developed and used for each explosives operation. These standards may be based on standards found in Army publications, such as regulations or technical manuals, or in higher headquarters standard publications.

Standing operating procedures (SOPs) for all explosives operations ensure workers have the information necessary to perform their tasks safely. Each worker is required to read the SOP or have the SOP read to him prior to the start of the operation. The SOPs are required to be readily available at the work site. Applicable parts of the SOP are required to be clearly posted at all work stations in the operation, such as bays within a building. When posting within the work site is not practical, the SOP will be posted at the entrance to the site. Procedures will be written in English and in the language workers understand if they do not understand English.

Hazard analyses are required to support the development of SOPs and ensure workers have the information necessary to perform their tasks safely. Explosives workers observing hazardous or potentially hazardous conditions will notify their supervisor immediately. Supervisors will correct the operations or practices which, if allowed to continue, could reasonably be expected to result in death or serious physical harm to personnel, major system damage, or endanger the installation's ability to accomplish its mission.

As a rule, all SOPs are reviewed annually by the local safety office to assure they are current with respect to the safety aspects of the operation. Specific instructions regarding periodic review, content, format, etc., may be found in applicable major Army command (MACOM) regulations. SOPs should include as a minimum, such items as safety requirements, personal protective clothing and equipment, environmental treatment, storage, disposal, spill requirements, personnel and explosives or material limits, equipment designation, and location and sequence of operations. No deviation from SOPs shall be permitted without the approval of the commanding officer or his designated representative.

Written procedures are not required for explosives ordnance disposal (EOD) emergency operations in connection with an approved render-safe procedure.

by: Robert Davidson
Safety Engineer
DSN 585-8627

The EXPLOSIVES SAFETY BULLETIN targets the ammunition/explosives community. It is printed in Savanna, Illinois. If you wish to submit an article that is of interest to the ammunition/explosives community, or if you have a request for more copies of the bulletin, please forward it to: Director, U.S. Army Technical Center for Explosives Safety, ATTN: SMCAC-ESM, Savanna, IL 61074-9639 or call us at DSN 585-8710/Commercial (815) 273-8710.

UPDATE - NEW UNDERGROUND AMMUNITION STORAGE TECHNOLOGIES (UAST) PROGRAM

The Joint U.S./Republic of Korea (ROK) Cooperative Research, Development and Test (RD&T) Program is on schedule. Our joint goal of producing design concepts for underground ammunition storage facilities to reduce quantity distance (QD) requirements and eliminate hazards to aboveground personnel and structures will be achieved. The Spring and Summer of 1994 were very busy and productive for us. Several promising design concepts were initially identified by small scale tests of up to 3 lbs net explosives weight (NEW). These were further refined and then tested at a larger scale; by the U.S. at 1/3 scale through extensive construction of tunnel and chambers in an old mine outside Magdalena, New Mexico; and by the ROK at 1/8 - 1/5 scale in their underground test site north of Seoul.

During this series of intermediate scale tests, we detonated up to 6,300 lbs NEW using Composition B bulk explosives, M15 antitank mines and 155 mm artillery projectiles as donor charges. The U.S. Army Engineers Waterways Experiment Station (USAEWES) and the ROK Agency for Defense Development (ADD) set up to 100 instruments and gages to measure the explosion effects such as pressure, shock and thermal effects. Measurements were taken at the detonation site, throughout the mine tunnel complex and outside the mine portal. The extensive instrumentation resulted in a large volume of data. That data is currently undergoing detailed analysis by the U.S. and ROK research staffs. Preliminary results of the analysis show significant promise for substantial reductions in the current Department of Defense (DOD) QD requirements for underground ammunition storage.

A U.S. Technical Advisory Group (TAG), specialists in explosion effects, explosives safety and explosives testing from throughout the DOD is consulted constantly and meets semi-annually to review the data, advise the researchers and identify additional potential applications for the results. The ROK has a similar TAG to assist and advise their researchers.

The European Klotz Club, consisting of representatives from France, Germany, Norway, Sweden, Switzerland, United Kingdom, and the United States is also involved and provides advice based on past testing and application of underground storage.

We plan to conduct a larger scale detonation for demonstration of the effectiveness and feasibility of the final underground facility concepts in late 1995. The Program will conclude in 1996 with Phase 5, Final Conceptual Design of Facilities. This final phase will consolidate the U.S. and ROK research and development (R&D) efforts into Department of Defense Explosives Safety Board (DDESB) and Ministry of National Defense (MND) approved concepts. We will also develop supplemental predictive computer models and implementing changes to Explosives Safety Standards.

Our plan for progressing from R&D to U.S. and ROK design drawings is now being developed. HQ, U.S. Army Engineer (USAE) is working to assure this 1997 transition to approved, standard underground facility designs goes smoothly and that published design drawings are available to interested users and installation planners worldwide.

by: Richard Cashin
QASAS
DSN 585-8713